IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ALIGN TECHNOLOGY, INC., Plaintiff and Counterclaim Defendant, v. 3SHAPE TRIOS A/S and 3SHAPE A/S, Defendants and Counterclaimants.	Civil Action No. 6:20-cv-00979-ADA

3SHAPE TRIOS A/S AND 3SHAPE A/S'S RESPONSIVE CLAIM CONSTRUCTION BRIEF

Kimberly Coghill *(pro hac vice)*
Bryan J. Cannon *(pro hac vice)*
TROUTMAN PEPPER HAMILTON SANDERS LLP
401 9th Street, N. W.
Suite 1000
Washington, D.C. 20004
Tel: 202.220.1200
Fax: 202.220.1465

William D. Belanger *(pro hac vice)*
Gregory Len *(pro hac vice)*
Frank D. Liu *(pro hac vice)*
Brittanee Petrik *(pro hac vice)*
Ana Spone *(pro hac vice)*
Gwendolyn Tawresey *(pro hac vice)*
TROUTMAN PEPPER HAMILTON SANDERS LLP
125 High Street
19th Floor, High Street Tower
Boston, MA 02110
Tel: 617.204.5100
Fax: 617.204.5150
Email: 3Shape979Troutman@Troutman.com

Bruce S. Sostek (No. 1885570)
Bruce.Sostek@tklaw.com
Massimo Ciccarelli (No. 00787242)
Max.Ciccarelli@tklaw.com
Thompson & Knight LLP
One Arts Plaza
1722 Routh Street
Suite 1500
Dallas, TX 75201-2533
Tel: 214.969.1237
Fax: 214.880.3252

Counsel for 3Shape Trios A/S and 3Shape A/S

TABLE OF CONTENTS

TABLE OF AUTHORITIES

Page(s)

CASES

EXHIBITS

Exhibit	Description
1	Summary Table of Parties' Proposed Constructions
2	Defendants and Counterclaim Plaintiffs 3Shape A/S and 3Shape TRIOS A/S's Updated Proposed Claim Constructions dated June 11, 2021
3	Plaintiff and Counterclaim Defendant Align Technology, Inc.'s Second Amended Proposed Constructions of Claim Terms dated June 11, 2021
4	Declaration of David Schaafsma, Ph.D. in Support of 3Shape's Responsive Brief on Claim Construction dated July 2, 2021
5	*3Shape A/S v Align Tech., Inc.*, Case No. 1:18-cv-00886-LPS, Defendant's Responsive Claim Construction Brief, Dkt. 109 (Mar. 13, 2020)
6	*Align Tech., Inc. v. 3Shape A/S*, Case No. PGR2018-00104, Patent Owner's Preliminary Response to the Petition for Post-grant Review of U.S. Patent No. 9,962,244, Paper 6 (Feb. 19, 2019)
7	*3Shape A/S v Align Tech., Inc.*, Case No. 1:18-cv-00886-LPS, Report and Recommendation, Dkt. 176 (May 6, 2020)

TABLE OF ABBREVIATIONS

Abbreviation	Description
’244 patent	U.S. Patent No. 9,962,244, parent patent to the ’711 patent
’333 patent	U.S. Patent No. 10,905,333 (Align OB (Dkt. 119), Ex. 3)
’711 patent	U.S. Patent No. 10,383,711 (Align OB (Dkt. 119), Ex. 2)
’815 patent	U.S. Patent No. 10,097,815 (Align OB (Dkt. 119), Ex. 1)
2D	Two-dimensional
3D	Three-dimensional
3Shape or Defendants	3Shape A/S and 3Shape Trios A/S, collectively
886 Case	*3Shape A/S v. Align Technology, Inc.*, C.A. No. 18-886-LPS (D. Del.)
Align OB	Align Technology, Inc.’s Opening Claim Construction Brief (Dkt. 119)
Align or Plaintiff	Align Technology, Inc.
Asserted Patents	U.S. Patent Nos. 10,097,815; 10,383,711; and 10,905,333, collectively
POSITA	Person of ordinary skill in the art

*emphasis added unless otherwise indicated

Pursuant to the Scheduling Order (Dkt. 82) and by agreement of the parties, 3Shape hereby submits its responsive claim construction brief addressing 3Shape's Asserted Patents.

I. U.S. PATENT NO. 10,097,815

The '815 patent relates to a scanner for determining the 3D geometry of the surface of an object. In particular, the '815 patent determines the 3D surface geometry by translating a lens in the scanner, capturing images at different lens positions, and determining the portions of the images that are in-focus. ('815 patent, 6:57–7:11.) One example the '815 patent describes for determining focus is a correlation measure acquired by comparing a reference signal against an input signal from the captured images. (*Id.* at 8:53–9:17.) Another aspect of the claimed inventions of the '815 patent, which is not at issue here, is the use of a motion sensor to assist in the stitching or registering of 3D scans or to remotely control the 3D model of the screen.

"Correlation measure" is the only term at dispute in the '815 patent. For the reasons below, this term does not require construction and should be given its plain and ordinary meaning.

A. "correlation measure" (Cls. 33, 40)

"Correlation measure" does not require construction because the asserted claims themselves define a "correlation measure" as generated "at least partly by comparing a reference signal representing the probe light with an input signal representing the light returned from the object to the camera." ('815 patent, cl. 40.)[1] This claim language follows the specification's definition of "correlation measure." (*Id.* at cl. 40; *see also id.* at 5:65–66 ("Correlation measure: A measure of the degree of correlation between a reference and input signal.").) The claim

[1] The relevant clause of claim 33 of the '815 patent is identical to that of claim 40, except the phrase "a reference signal representing the probe light" is replaced with "a reference signal representing the probe light incorporating the spatial pattern" ('815 patent, cl. 33.)

language is clear and consistent with the specification. Therefore, no further construction is necessary beyond the plain language of the claims.

Align seeks to rewrite this clear claim language, arguing that the specification explicitly defines that term. The specification, like the claim, provides that the "correlation measure" is generated using the "reference signal" and "input signal." Similarly, the specification provides definitions of "reference signal" and "input signal" that also reflect the language used in the claim. Align's merged definition of "correlation measure," "reference signal," and "input signal" does not clarify the meaning of the asserted claims beyond what the claims themselves state. Rather, it adds confusion by rewriting the clear claim language under the guise of a definition. Nor does Align cite any authority for the proposition that the exact language of the specification's definition must be imported into the claim where the claim provides its own consistent definition of the term.

Align's proposed construction introduces redundant language that will confuse the jury. In particular, the claim language already requires that the "correlation measure" be generated by comparing a "reference signal" with an "input signal." (*Id.* at cl. 40.) Incorporating this explanation into the construction of "correlation measure" is improper. *See*, *e.g. Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1237 (Fed. Cir. 2016) ("Construing a claim term to include features of that term already recited in the claims would make those expressly recited features redundant"); *Thomas Swan & Co. v. Finisar Corp.*, Case No. 2:13-CV-00178, 2014 U.S. Dist. LEXIS 86209 at *48 (E.D. Tex., June 25, 2014).

Also, while Align did not identify "input signal" and "reference signal" for construction, it now attempts to incorporate constructions for those terms as part of the "correlation measure"

term. If "input signal" and "reference signal" need construction, which they don't, they should be construed separately to avoid further confusion for the jury.

Align's construction also creates confusion regarding whether two signals are required by the claim language or four. Inserting Align's proposed construction into asserted claim 33 illustrates the confusion:

Relevant Language of Claim 33	**Relevant Language of Claim 33 with Align's Construction of "Correlation Measure"**
"a processor configured to generate…a correlation measure…at least partly by comparing **a reference signal** representing the probe light incorporating the spatial pattern with **an input signal** representing the light from the object to the camera."	"a processor configured to generate…~~a correlation measure~~ [a measure of the degree of correlation between **(1) a signal derived from the pattern**, and **(2) light input signal or sensor input signal** from the sensors in the camera]…at least partly by comparing **a reference signal** representing the probe light incorporating the spatial pattern with **an input signal** representing the light from the object to the camera."

Substituting Align's construction of "correlation measure," which includes the redefinition of "reference signal" and "input signal" creates uncertainty regarding whether the "signal derived from the pattern" is a separate limitation from the "reference signal representing the probe light incorporating the spatial pattern" recited in the claims and, likewise, whether the "light signal or sensor input signal from the sensors in the camera" is a separate from the "input signal representing the light from the object to the camera." Considering the original claim language is clear on its face that only two signals, a "reference signal" and an "input signal," are required, Align's construction should be rejected. *Solas Oled LTD v. Samsung Display Co., LTD*, Case No. 2:19-CV-00152, 2020 U.S. Dist. LEXIS 67490 at *24–25 (E.D. Tex., Apr. 17, 2020) (rejecting constructions that "tend to confuse rather than clarify the scope of the claim").

II. U.S. PATENT NO. 10,383,711

The '711 patent is entitled "Focus Scanning Apparatus Recording Color," and relates to a scanner for recording surface geometry and color of an object using different sets of pixels from the same sensor.

There are four terms in dispute with respect to the '711 patent. Align contends that two of the terms — "image pixels" and "low weight" — are indefinite. But as explained below, a POSITA would have understood the meaning of the terms. For the remainder of the disputed terms, Align's proposed constructions are not only inconsistent with the intrinsic record, but also improperly attempt to import limitations from the specification into the claims.

A. "multichromatic probe light for illumination of the object" (Cl. 1)

The term "multichromatic probe light for illumination of the object" is clear on its face and should be given its plain and ordinary meaning, which is "light having more than one color at the same time, that strikes the object" because (i) the specification confirms multichromatic means more than one color; (ii) the prosecution history confirmed the plain meaning distinction of multichromatic from monochromatic; and (iii) Align's own expert, Dr. Lambertus Hesselink, confirmed that the probe light must "strike[] the object" in order to illuminate it.

First, the plain meaning of "multichromatic" is more than one color. (Ex. 4, ¶ 13; *see*, *e.g.*, '711 patent, 5:34–39; *see also id.* at 16:9–10, 16:47–48, 16:52–55, 9:30–39, 12:27–35.) The specification confirms this meaning because it describes "multichromatic" light in terms of a broadband, multi-colored light source, *i.e.*, that the light produced includes wavelengths in a broad range spanning across different colors of light. (Ex. 4, ¶ 13; *see also* '711 patent, 5:34–39; *see also id.* at 12:27–35, 16:9–10, 16:47–48, 16:52–55.) Align agreed with the plain and ordinary understanding of multichromatic in its proposed construction for a nearly identical term from the parent of the '711 patent, the '244 patent, in prior litigation. There, Align admitted,

consistent with 3Shape's construction, that "there can be no dispute" that those skilled in the art understand a multichromatic probe light to be a light of "more than one color." (Ex. 5, 9.)

Second, multichromatic light must have more than one color at the same time to distinguish multichromatic light from monochromatic (*i.e.* single color) light. If the probe light switched between colors — *e.g.*, flashing red, then green, then blue light — it would be *mono*chromatic at any given time. Thus, *multi*chromatic light must emit multiple different colors of lights at once. (Ex. 4, ¶ 14.) The prosecution history emphasizes the importance of this distinction. Specifically, during post-grant review of the '244 patent, 3Shape explained that "[t]he switching monochromatic light sources do not produce the claimed 'multichromatic probe light.'" (*See*, *e.g.*, Ex. 6, 22.) Thus, prior art monochromatic light sources that "switch[ed]" on and off such that only one is on at a given time differed from the inventions of the claims because the light sources did not produce multichromatic light simultaneously. (*See*, *e.g.,* Ex. 4, ¶ 14; *see also* '711 patent, 9:30–32 ("The scanner system disclosed here comprises a multichromatic light source, for example a white light source, for example, a ***multi-die LED***.").) Likewise, the '711 patent specification discloses that the multichromatic light source can take the form of a multi-part LED with monochromatic emitters of different colors that operate at the same time to emit a combination of light that appears as white light. ('711 patent, 16:9–10, 16:47–48, 16:52–55.)

Third, the plain and ordinary meaning requires that the light from the probe light must "strike[] the object" in order to illuminate it. (*See id.* at 9:33–36, 4:44–47, 5:1–5.) The specification confirms this when it explicitly states that the "light received from the scanned object" is the "probe light returned from the object surface." (*Id.* at 9:33–36.) Indeed, Dr. Hesselink's declaration, states the recited claim term of "illumination" is "precisely defined in

terms of the luminous flux per unit area, expressed as lumens per unit area, incident on the lighted object." (Align OB, Ex. 4, ¶ 30.) Accordingly, the Court should apply the plain and ordinary meaning of "light having more than one color at the same time, that strikes the object."

Align argues that the plain and ordinary meaning of this term simply requires that the light have "more than one wavelength." (Align OB, 5.) This proposal is both incomplete and confusing. In particular, Align's construction ignores the word "multichromatic." This omission introduces an illogical result where, for example, light having wavelengths of 670 nm and 671 nm would meet Align's proposed construction, even though both wavelengths are red and therefore are not multichromatic. (Ex. 4, ¶ 15.) Because weight and meaning must be given to the word "multichromatic," this is improper. *Funai Elec. Co., Ltd. v. Daewoo Elecs. Corp.*, 616 F.3d 1357, 1372 (Fed. Cir. 2010) ("We must give meaning to all the words in [the] claims.") (citation omitted).

The patentee could have, but did not, use the word "multi-wavelength." A POSITA would understand that there is a difference between multi-wavelength and multichromatic. (Ex. 4, ¶ 15.) The '711 patent specification reflects this. Claim 1, for example, recites a system for recording the surface color of an object, using in part, a color image sensor. (*See also* '711 patent, 9:30–39.) A color image sensor has color-specific filters in known wavelength ranges — *e.g.*, red, green, and blue. (*Id.* at 10:12–16 ("the color image sensor comprises a color filter array comprising at least three types of color filters, each allowing light in a known wavelength range, W1, W2, and W3 respectively, to propagate through the color filter.").) A pixel in the image sensor with a "red" filter will detect wavelengths of light in a selected range — *e.g.*, 620-750 nm. That red pixel will not distinguish between 670 nm and 671 nm light specifically. (Ex. 4, ¶ 15.) Thus, for its construction to make sense, Align would have to specify that the "more than one

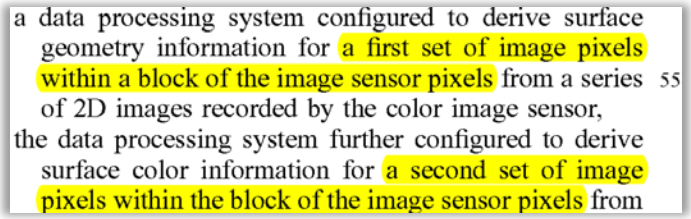
wavelength" of its construction falls into ranges for more than one color as described in the patent. It has not done so.

Because 3Shape's proposed construction properly reflects the plain and ordinary understanding of the term and is supported by the intrinsic record, it should be adopted.

B. "image pixels"/"image sensor pixels" (Cl. 1)

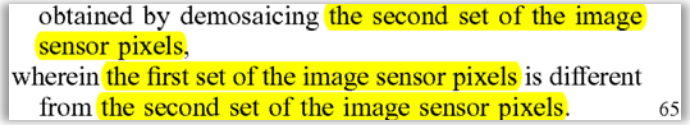
Align contends that "image pixels" and "image sensor pixels" have two different meanings, and under its interpretation, the '711 patent claims are indefinite. But the intrinsic record establishes that "image pixels" and "image sensor pixels" both refer to pixels on the image sensor, as 3Shape's construction reflects. As such, the Court should adopt 3Shape's construction. Moreover, even if the Court finds "image pixels" and "image sensor pixels" have different meanings, as Align asserts, a POSITA would have readily understood the scope of the claim. Thus, claim 1 is definite.

The claim language establishes that "image pixels" and "image sensor pixels" both refer to pixels on the image sensor. Specifically, claim 1 recites a first set and a second set of image pixels "within" a block of image sensor pixels:


a data processing system configured to derive surface geometry information for a first set of image pixels within a block of the image sensor pixels from a series of 2D images recorded by the color image sensor,
the data processing system further configured to derive surface color information for a second set of image pixels within the block of the image sensor pixels from

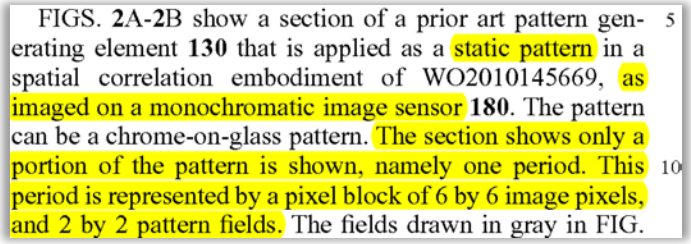
('711 patent, 19:53–59.) As Align agrees "image sensor pixels" refer to the physical pixels on the image sensor, a straightforward reading of the claim dictates that both sets of "image pixels" are physical pixels "within" the block of the physical pixels on the image sensor. (*See* Align OB, 8; *see also* § II.C, *infra* (construing the claimed "block of image sensor pixels" as "two or more adjacent pixels *on the image sensor*").)

In contrast, the claim does not support Align's interpretation that "image pixels" are digital pixels in a 2D image, and "image sensor pixels" are physical pixels on the image sensor. For example, claim 1 later refers to the same "first set" and "second set" of image pixels as "the first set of the image *sensor* pixels" and "the second set of the image *sensor* pixels":


obtained by demosaicing the second set of the image sensor pixels,
wherein the first set of the image sensor pixels is different from the second set of the image sensor pixels.

(*Id.* at 19:61–65.) Moreover, dependent claims 2, 3, 4, 5, 6, and 7 all refer to the "first set" and "second set" of the "image *sensor* pixels," further confirming that the patentee used both "image pixels" and "image sensor pixels" in the claims when referring to pixels on the image sensor. (*See id.* at 19:66–20:17.)

Align attempts to support its position that "image pixels" refer to pixels on an image by citing to the specification. But the specification confirms that "image pixels" can refer to physical pixels on the image sensor. For example, the specification describes imaging a static pattern onto "a pixel block of 6 by 6 image pixels" on a monochromatic image sensor:


FIGS. **2**A-**2**B show a section of a prior art pattern generating element **130** that is applied as a static pattern in a spatial correlation embodiment of WO2010145669, as imaged on a monochromatic image sensor **180**. The pattern can be a chrome-on-glass pattern. The section shows only a portion of the pattern is shown, namely one period. This period is represented by a pixel block of 6 by 6 image pixels, and 2 by 2 pattern fields. The fields drawn in gray in FIG.

(*See id.* at 17:24–27.) As such, the specification also uses "image pixels" to refer to physical pixels on an image sensor. Since the "image pixels" and "image sensor pixels" recited in claim 1

both refer to pixels on the image sensor, Align's indefiniteness argument, based on each term having a different meaning, fails.[2]

Even under Align's interpretation, its expert declaration confirms that a POSITA would have understood the scope of claim 1. Align argues that because "image pixels" are digital pixels in an image, and "image sensor pixels" are physical pixels on the sensor, a POSITA would not have understood what it meant for a "set of image pixels" to be "within a block of image sensor pixels." (*See* Align OB, 9.) But Align's expert declaration states that a POSITA would have understood that "image pixels" — *i.e.*, digital pixels in an image — are *derived* from "image sensor pixels" — *i.e.*, physical pixels on the image sensor. (*See* Align OB, 8.) Based on this understanding, a POSITA would have readily understood that for a set of "image pixels" to be within a block of "image sensor pixels," the set of "image pixels" are simply derived from physical pixels in the corresponding position in the block of "image sensor pixels." (Ex. 4, ¶¶ 17–18; *see, e.g.*, '711 patent, 19:10–14 ("In each 2D image 662 a portion [of digital pixels] 663 corresponding to a block of image sensor pixels are indicated.").) Simply put, Align's own expert confirms that a POSITA would not have any trouble understanding the meaning of the claims. Accordingly, even under Align's interpretation of "image pixels" and "image sensor pixels," Align has failed to establish by clear and convincing evidence how "image pixels" and "image sensor pixels" are indefinite.

[2] If the Court finds the meaning of "image pixels" and "image sensor pixels" in claim 1 ambiguous, the Court should enter a construction that clarifies those terms rather than adopting Align's proposed construction, which introduces ambiguity intended to support a finding that the claims are indefinite. *See Ruckus Wireless, Inc. v. Innovative Wireless Sols., LLC*, 824 F.3d 999, 1004 (Fed. Cir. 2016) ("If, after applying all other available tools of claim construction, a claim is ambiguous, it should be construed to preserve its validity.").

C. "block of the image sensor pixels"/"blocks of image sensor pixels" (Cls. 1, 9, 42)

Align proposes for the first time in its opening brief that "block of the image sensor pixels"/"blocks of image sensor pixels" should be construed as "two or more adjacent pixels on the image sensor." (Align OB, 11.) Prior to its opening brief, Align construed "block of the image sensor pixels" as additionally requiring a "two-dimensional array" (*see* Ex. 3, 14.) — a limitation the Delaware District Court previously rejected during claim construction for a similar term in a parent patent in another matter between the parties. (Ex. 7, 3, 15–17.) While 3Shape believes "block" does not require construction, 3Shape agrees to adopt Align's newly proposed construction for "block of the image sensor pixels" as "two or more adjacent pixels on the image sensor" to avoid unnecessary disputes before the Court.[3]

D. "data processing system" terms (Cl. 1)

The "data processing system" terms should be given their plain and ordinary meaning in light of the specification, as understood by a POSITA. No further construction is necessary, as the meaning of the claimed "data processing system" can be readily understood from the surrounding claim language, as the teachings of the specification confirm. 3Shape disagrees with Align's position that "data processing system" is subject to § 112 ¶ 6, as explained below. To the extent the Court finds this term is a means-plus-function limitation, however, 3Shape provides an alternative construction.

[3] Align did not propose "blocks of image sensor pixels" for construction prior to its opening brief, and Align's proposed construction for a single "block" — *i.e.*, two or more adjacent pixels on the image sensor — does not accurately reflect the meaning of multiple "blocks of image sensor pixels." As such, 3Shape believes the "blocks" term does not require construction, given the parties' agreed construction for "block of the image sensor pixels."

No Construction Required. The meaning of the claimed "data processing system" is evident from the plain language of the claims and no further construction is required. The claims not only specify the particular information the "data processing system" (*i.e.*, surface geometry and surface color information) generates, but also detail the particular image pixel sets that are used to generate that information. ('711 patent, cl. 1.) The claims go on to specify that the surface color information is obtained by "demosaicing" the second set of image sensor pixels. Simply put, the plain language of the claims explains what the "data processing system" is doing in the context of the claimed invention; there is no need to provide further construction where the meaning of the claims is apparent from that plain language.

Consistent with the language of the claims, the specification likewise describes that the data processing system "is configured for generating a sub-scan of a part of the object surface based on surface geometry information and surface color information derived from a plurality of blocks of image sensor pixels." (*Id.* at 4:5–11; *see also id.* at 11:43–58, 14:16–20, 14:33–36.) Thus, no construction is necessary, beyond the constructions set forth above for "image pixels" and "image sensor pixels." (*See* § II.B, *supra*.)

Align's non-§ 112 ¶ 6 proposed construction of "data processing system" for surface geometry improperly imports a limitation requiring the surface geometry information to be derived from a 2D image that is also used to derive color information. (Align OB, 14.) Similarly, Align's non-§ 112 ¶ 6 proposed construction of "data processing system" for surface color improperly imports a limitation requiring the color information to be derived from a 2D image that is also used to derive geometry information. (*Id.* at 15.) This is contrary to the plain language of the claims, and there is nothing in the intrinsic record to compel such limitations.

First, claim 1 (the sole independent claim) explains that the surface geometry information is derived from "a first set of image pixels … from *a series of 2D images* recorded by the color image sensor," while the surface color information is derived from "a second set of image pixels … from *at least* one 2D image recorded by the color image sensor." ('711 patent, cl. 1.) There is nothing in the plain language that requires the 2D images used to derive the surface geometry information to be the same 2D image used to derive the color. Second, the dependent claims further confirm the error in Align's construction. For example, dependent claim 16 (which depends indirectly from claim 1) recites that the color is generated from "one of the 2D images of the series of 2D images," where the series of 2D images refers to the series of 2D images recited in claim 1 used to derive surface geometry. (*Id.* at cl. 16.) More simply put, claim 16 contemplates that the 2D images used to derive surface geometry are also used to derive color. Applying the doctrine of claim differentiation, this means that in claim 1, the 2D images used to derive surface geometry do not necessarily need to be used to derive color information as Align's construction suggests. *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 1380–81 (Fed. Cir. 2006) ("'[C]laim differentiation' refers to the presumption that an independent claim should not be construed as requiring a limitation added by a dependent claim.").

Finally, nothing in the intrinsic record compels Align's construction. The instances where the specification contemplates deriving surface color information from the series of 2D images from which surface geometry is derived is merely described as an embodiment, and does not purport to limit the scope of the claims. (*See, e.g.*, '711 patent, 7:1–7.); *Akamai Technologies, Inc. v. Limelight Networks, Inc.*, 805 F.3d 1368, 1376 (Fed. Cir. 2015) ("[E]ven where a patent describes only a single embodiment, claims will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or

expressions of manifest exclusion or restriction." (citation omitted)). Because nothing in the intrinsic record clearly disclaims the plain and ordinary meaning of the claims, Align's construction should be rejected. *See*, *e.g.*, *Housey Pharms., Inc. v. Astrazeneca UK Ltd.*, 366 F.3d 1348, 1351–52 (Fed. Cir. 2004).

"Data Processing System" Does Not Invoke § 112 ¶ 6. Because the claim term "data processing system" does not use the word "means," there is a presumption that the term does not invoke § 112 ¶ 6. *Zeroclick, LLC v. Apple Inc.*, 891 F.3d 1003, 1007 (Fed. Cir. 2018); *see also Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (*en banc*). That presumption can be overcome only if Align "demonstrates that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function." *Zeroclick*, 891 F.3d at 1007 (quoting *Williamson*, 792 F.3d at 1348). Align has failed to carry its burden.

The term "data processing system" as used in the asserted claims recites sufficiently definite structure for performing the recited function. As discussed above, the claim does not merely recite "data processing system" along with a function. Rather, it specifies the particular image pixels and 2D images that are used to perform the functions of deriving surface geometry and surface color information. (*See* '711 patent, cl. 1.) Further, the claim language recites that the surface color information is obtained by the data processing system by "demosaicing" the image sensor pixels. (*Id.*) Thus, the claims recite sufficient structure, as they specify details about the particular structure the data processing system uses to perform the claimed function. *See, e.g.*, *Masimo Corp. v. Philips Elecs. North Am. Corp.*, Case No. 09-80-LPS, 2015 U.S. Dist. LEXIS 160645 at *25 (D. Del., Dec. 1, 2015) (finding the claimed "processor" not subject to § 112 ¶ 6 because the "claim provides an input-output structure for the processor and explains

how the processor interacts with the other components of the claim."); *see also Datatreasury Corp. v. Ingenico S.A.*, Case No.5:02CV95, 2004 U.S. Dist. LEXIS 31458 at *62–66 (E.D. Tex., Feb. 19, 2004); *accord Datatreasury Corp. v. Wells Fargo & Co.*, Case No. 2:05-CV-291, 2009 U.S. Dist. LEXIS 133483 at *197–200 (E.D. Tex., May 11, 2009) (finding the term "data processing subsystem" not subject to § 112 ¶ 6 and the term "subsystem" to be structurally the same as "system"). Further, a POSITA would understand that the data processing system connotes structure in light of the specification, as specifically described by the image processor, microprocessor unit, and computer readable medium in the patent's specification, which are computer systems with input, processing, storage output, and control functions. (*See*, *e.g.*, '711 patent, 11:43–58, 14:16–20, 14:33–36; Ex. 4, ¶ 22.)

3Shape's Alternative § 112 ¶ 6 Construction. Though the "data processing system" terms do not invoke § 112 ¶ 6, 3Shape's identified function and structure should be adopted if the Court finds means-plus-function construction is appropriate because 3Shape's proposals mirror the functions the claims expressly recite and only the structures the specification teaches that are necessary to perform those functions. As discussed above, the specification teaches that example structures of the "data processing system" comprise an image processor, a microprocessor unit, and a computer readable medium on which computer implemented algorithms are stored. (*See*, *e.g.*, '711 patent, 11:43–58, 14:16–20, 14:33–36.) 3Shape's proposed structures include each of these examples.

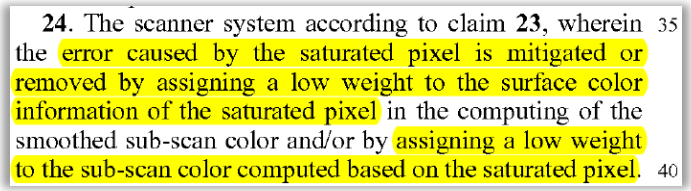
Align's proposed structure under its § 112 ¶ 6 construction improperly limits the 2D image used to derive geometry information to a 2D image that is used to derive color information. (Align OB, 14.) Similarly, Align's § 112 ¶ 6 proposed construction of "data processing system" for surface color improperly imports a limitation requiring the color

information to be derived from a 2D image that is also used to derive geometry information. (*Id.* at 15.) Accordingly, should the Court determine that a means-plus-function construction is necessary, Align's proposed structure should be rejected for the same reasons as its non-§ 112 ¶ 6 proposed constructions of the "data processing system" terms.

E. "low weight" (Cl. 24)

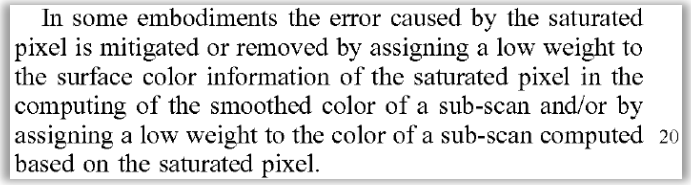
The term "low weight" is not indefinite. The specification and surrounding claim language inform a POSITA, with reasonable certainty, about the scope of the invention. *See Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Align argues that "low" is a "relative term," and that the intrinsic evidence "fails to inform one of skill in the art, with any reasonable degree of certainty, the boundaries for this term." (Align OB, 19.) Align's expert, Dr. Hesselink, further asserts that the term "low weight" does not have an "ordinarily understood technical meaning in the field" and that the term "low weight" is indefinite because it is not clear what value would constitute a "low weight." (Align OB, Ex. 4, ¶¶ 59–60.) But "employing terms of degree has long been found definite where it provided enough certainty to one of skill in the art when read in the context of the invention." *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370 (Fed. Cir. 2014); *see also One-E-Way, Inc. v. Int'l Trade Comm'n*, 859 F.3d 1059, 1064 (Fed. Cir. 2017) (finding "relative terms and words of degree" do not render patent claims invalid if they "inform those skilled in the art about the scope of the invention with reasonable certainty" (quoting *Nautilus*, 572 U.S. at 910). There is no legal requirement to specify the exact bounds of the claim with mathematical precision. *See Interval Licensing LCC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014) ("absolute or mathematical precision is not required" to establish the definiteness of the claims).

Here, the claim language surrounding the "low weight" term explains that saturated pixels are assigned a low weight relative to pixels that are not saturated to achieve the result of mitigating or removing error caused by the saturated pixels:



24. The scanner system according to claim **23**, wherein the error caused by the saturated pixel is mitigated or removed by assigning a low weight to the surface color information of the saturated pixel in the computing of the smoothed sub-scan color and/or by assigning a low weight to the sub-scan color computed based on the saturated pixel.

('711 patent, cl. 24.) The specification similarly explains the meaning of "low weight":



In some embodiments the error caused by the saturated pixel is mitigated or removed by assigning a low weight to the surface color information of the saturated pixel in the computing of the smoothed color of a sub-scan and/or by assigning a low weight to the color of a sub-scan computed based on the saturated pixel.

(*Id*. at 9:16–21; *see also id.* at 11:59–64, 12:5–13.) A POSITA reading the claims in light of the specification and surrounding claim language would have therefore understood that the "low weight" should be set in such a manner to mitigate or remove error caused by the saturated pixels. (Ex. 4, ¶¶ 23–26.) Further informing a POSITA of the meaning of the term, the specification uses "low weight" in the context of calculating a "weighted average of color values derived for corresponding points in overlapping sub-scans." ('711 patent, 9:6–7.) At the time of the patent, a POSITA would have been familiar with assigning lower and higher weights to certain values when performing a weighted average function. (Ex. 4, ¶ 25.) Accordingly, the specification and surrounding claim language inform a POSITA, with a reasonable degree of certainty, the meaning of the term and the scope of the claim, consistent with its ordinarily understood technical meaning in the field of assigning a lower weight to certain values to perform the intended function. (Ex. 4, ¶¶ 23–26.)

III. U.S. PATENT NO. 10,905,333

The '333 patent generally relates to 3D scanner systems that use different wavelengths of light to record tooth data. The claims further describe the 3D scanner system as having a data processor for converting the recorded data into digital representations and displaying the representations.

There are three terms in dispute for the '333 patent. For each disputed term, Align's proposed constructions ignore the plain language of the claims and import limitations from the specification. 3Shape's proposed constructions, on the other hand, reflect the plain and ordinary meaning of the terms, and should be adopted.

A. "cariogenic region of the tooth" (Cls. 1, 3, 20, 21, 38)

Align's proposed construction of "cariogenic region of the tooth" attempts to import three additional limitations into the claims. First, Align narrowly defines a "cariogenic region" as a region having tooth decay, despite the intrinsic record and extrinsic evidence more broadly defining the region as either having tooth decay or having characteristics producing or promoting tooth decay. Second, Align asserts that the claimed 3D scanner system must "detect" the cariogenic region, despite the claims not requiring a detection step. Third, Align contends the claimed 3D scanner system must use emitted fluorescence to detect the cariogenic region, despite the claims and specification describing different imaging techniques. Because Align seeks to import limitations into the claims without support from the intrinsic record, the Court should reject Align's proposed construction and apply the plain and ordinary meaning. If the Court finds it necessary to define the plain and ordinary meaning, a "cariogenic region of the tooth" means "a region of the tooth with either tooth decay or characteristics producing or promoting tooth decay."

First, both the intrinsic record and the extrinsic evidence that Align cites refute Align's interpretation that "cariogenic region" must include areas with tooth decay. While the specification describes the cariogenic regions as having, for example, caries in more or less developed stages or caries lesions, the specification also describes cariogenic regions as having demineralization suggesting early stages of caries, pathogenic microflora, or fluorescent metabolites of cariogenic bacteria. ('333 patent, 13:41–48, 13:55–58, 14:4–11.) And under the doctrine of claim differentiation, because dependent claims 16 and 34 describe the cariogenic region as a "region with caries," the independent claims are necessarily broader in scope. *See Curtiss-Wright*, 438 F.3d at 1380–81. Also, dependent claims 17, 19, 35, and 37 describe the cariogenic region as having demineralization or cariogenic bacteria, further confirming that the patent does not limit "cariogenic region" to areas with caries. Moreover, the dictionary definition Align cites defines "cariogenic" as "producing or promoting the development of tooth decay," confirming that "cariogenic regions" includes regions that have characteristics that produce or promote tooth decay, such as demineralization or pathogenic bacteria — not exclusively regions that already have tooth decay, as Align proposes. (Align OB, Ex. 11, 5.)

Second, Align's construction requires the claimed 3D scanner system to "detect" the cariogenic region. By "detect," Align argues that the claimed system must perform a clinical diagnosis that a dentist traditionally performs to determine which regions of the teeth have tooth decay. (Align OB, 21–22.) Align's principal argument relies on its premise that a "scanner system must first detect a 'cariogenic region' in order to display it." (Align OB, 22.) Yet the claims recite recording data for a cariogenic region of the tooth, converting that data into a digital representation, and displaying or visualizing that digital representation of the cariogenic region, all without the 3D scanner detecting or identifying the cariogenic region. ('333 patent,

cl. 1, 32:7–8, 32:25–26, 32:31–33, 32:34–36.) Furthermore, the specification refutes the basic premise of Align's argument by stating that it discloses 3D scanner systems that detect *or* visualize the cariogenic regions. (*See*, *e.g.*, *id*. at Abstract, 2:28–30 ("3D scanner system for detecting and/or visualizing cariogenic regions").)

Third, Align's proposed construction would restrict the claims to only 3D scanner systems that use emitted fluorescence. But the intrinsic evidence Align cites does not support importing such a limitation. In support of its construction, Align generally notes that the specification discloses embodiments that use emitted fluorescence to record data for the cariogenic region. (Align OB, 22.) But well-established claim construction principles dictate that particular embodiments and examples appearing the specification should not be read into the claims, and limitations from embodiments in the specification should not be read into the claims absent a clear indication in the intrinsic record that the patentee intended to limit the claims in that manner. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004); *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988)). Align next cites to a sentence of the Summary section of the specification, which states that one objective of the invention is to map fluorescence and/or a representation of a cariogenic region onto a digital 3D representation of the teeth. (Align OB, 22; '333 patent, 2:14–17.) This sentence does not provide a clear indication that the patentee intended to limit the claims to using emitted fluorescence; it merely provides one exemplary objective of the invention — *i.e.*, to map either fluorescence or a representation of a cariogenic region to a 3D representation of the teeth. (*See* '333 patent, 2:14–17.)

In fact, the claim language establishes that the 3D scanner system does not require emitted fluorescence to record data for the cariogenic region. Specifically, while fluorescence involves emitting light at one wavelength and detecting light at a different (longer) wavelength, the claims describe a device that can emit light at one wavelength and detect the reflected light at the same wavelength — *i.e.*, reflectance imaging. ('333 patent, 32:20–26; Ex. 4, ¶¶ 27–29; Align OB, Ex. 10, ¶¶ 31–32 (explaining fluorescence involves emitting light at certain wavelengths and detecting light at different (longer) wavelengths).) Additionally, the doctrine of claim differentiation confirms that independent claims 1 and 21 of the '333 patent do not require fluorescence to record data for the cariogenic regions, as dependent claims 9 and 29 recite selecting the second wavelength "to excite a fluorescent material of the tooth." Accordingly, the intrinsic record refutes Align's proposed construction, which would limit all claims to using emitted fluorescence to detect a region of the tooth with tooth decay.

B. "a second light source" (Cls. 1, 20, 21, 33, 38)

For the same reasons discussed above in § III.A, the Court should reject Align's proposed construction of "a second light source," which also seeks to limit the claims to fluorescence. In support of its construction, Align again cites to exemplary embodiments in the specification. (Align OB, 23–24.) But as with the "cariogenic region" term, the intrinsic record does not provide a clear indication that the patentee intended to limit this term to fluorescence. And, as discussed above, the claims themselves describe a device configured to emit and detect light at the same wavelength, which can include emitting light at one wavelength and detecting reflected light at the same wavelength, which is characteristic of reflectance imaging. ('333 patent, 32:20–26.) The specification further describes multiple exemplary embodiments on how the system could operate, including embodiments where the device emits light at the second wavelength and detects the reflected light from the object at the second wavelength. (*See*, *e.g.*,

id. at cls. 1, 21, 5:58–65, 10:13–26; Ex. 4, ¶¶ 28–29.) As such, Align's proposed construction should be rejected because it impermissibly imports the limitation of emitted fluorescence, and the Court should find that the "a second light source" term requires no construction.

C. "the 3D intraoral scanner device[4] is configured such that at least one of the one or more image sensor(s) detects light at the second wavelength, thereby configured to record data for the cariogenic region of the tooth" (Cls. 1, 21)

Align's proposed construction injects ambiguity into the claim and presents at least three problems: (i) it rewrites claim language describing the configuration of the 3D intraoral scanner device ("the 3D intraoral scanner device is…thereby configured to record data…") into claim language that requires the performance of certain additional steps ("the 3D intraoral scanner detects and stores data…"); (ii) it impermissibly limits the one or more image sensor(s) to *only* detecting light at the second wavelength to record data for the cariogenic region; and (iii) it removes "at least one of the one or more" language from the claim, thereby narrowing the claim scope. In contrast, 3Shape's plain and ordinary meaning preserves the meaning of the claim while emphasizing the inclusive or open-ended nature of a claim that uses the transitional term "comprising."

The Court should therefore adopt the plain and ordinary meaning proposed by 3Shape because it mirrors the claim language with the minor addition of "at least" before "the second wavelength":

Claim Language	3Shape's Plain and Ordinary Meaning
"the 3D intraoral scanner device is configured such that at least one of the one or more image sensor(s) detects light at the second wavelength, thereby configured to record data for the cariogenic region of the tooth"	"the 3D intraoral scanner device is configured such that at least one of the one or more image sensor(s) detects light **at least** at the second wavelength, thereby configured to record data for the cariogenic region of the tooth"

[4] Align's construction contains a typographical error and omits the word "device."

The addition of the phrase "at least" in 3Shape's construction appropriately recognizes the open-ended nature of a claim that uses the transitional term "comprising." *Gillette Co. v. Energizer Holdings Inc.*, 405 F.3d 1367, 1371–73 (Fed. Cir. 2005) ("The word 'comprising' transitioning from the preamble to the body signals that the entire claim is presumptively open-ended."). Because claims 1 and 21 recite both a "3D scanner system comprising" and "a 3D intraoral scanner device comprising," the recited elements are essential, but "other elements may be added and still form a construct within the scope of the claim." *Mars, Inc. v. H.J. Heinz Co., L.P.*, 377 F.3d 1369, 1375–76 (Fed. Cir. 2004) (citing *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501 (Fed. Cir. 1997)).

On the other hand, the Court should reject Align's proposed construction because it drastically rewrites the claim language without support from the intrinsic record and in violation of the transitional "comprising" terms. For example, Align's proposed construction converts the claim, which describes how the 3D intraoral scanner device "is configured," into a new claim requiring that the device operate in a specific way. For example, instead of the claimed 3D intraoral scanner device configured to record data for the cariogenic region, Align's proposed construction would require the device to actively perform two specific steps — detect and store data. (Align OB, 24–25.) Align's construction reads "configured to" — indicating structural elements for performing a function — out of the claim language and instead merely recites the function itself. Align cannot rewrite the claim language and must give meaning to all words in the claim. *See Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1383–84 (Fed. Cir. 2008); *Funai Elec. Co., Ltd. v. Daewoo Elecs. Corp.*, 616 F.3d 1357, 1372 (Fed. Cir. 2010). Further, Align's construction improperly mixes language fit for a method claim with the patent's

system claim. *See IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377, 1383–84 (Fed. Cir. 2005).

Align's proposed construction also improperly limits the "one or more image sensor(s)" to detecting only a single wavelength of light — *i.e.*, light at the second wavelength — in order to record data for the cariogenic region. Align's arguments opposing 3Shape's construction explain:

> The claim limitation does not simply require that an image sensor detect light at a number of wavelengths, one of which is the same as the wavelength emitted by the second light source. Rather, the last clause refers to "thereby configured to record data for the cariogenic region of the tooth," which requires that it is the detection of light at that same second wavelength that leads to the recording of data. 3Shape's proposed construction inappropriately reads out the "thereby" clause that creates the tie between the detection of light at the second wavelength and the recording of data.

(Align OB, 25.) Contrary to Align's assertion, 3Shape's plain and ordinary meaning does not read the "thereby" clause out of the claim. Instead, Align has imported, without support, an exclusivity requirement into the "thereby" clause. A 3D scanner system can be "configured to record data for the cariogenic region of the tooth" by detecting light at the second wavelength, even if it detects other wavelengths as well. Therefore, Align bases its assertion that 3Shape's plain and ordinary meaning "reads out" the "thereby" clause on a false premise — that the claim restricts the 3D intraoral scanner device to *only* using the second wavelength to record data for the cariogenic region.

Lastly, Align's proposed construction changes "at least one of the one or more image sensor(s)" to "the image sensor(s)." (Align OB, 24.) As written, the claim only requires at least one of the image sensor(s) to detect light at the second wavelength. But under Align's proposed construction, all image sensor(s) present in the claimed 3D scanner system must detect light at

the second wavelength. Again, Align provides no support for narrowing the claim scope. Accordingly, the Court should reject Align's construction and adhere to the plain and ordinary meaning of this phrase.

IV. CONCLUSION

For the foregoing reasons, 3Shape respectfully requests the Court adopt 3Shape's proposed constructions.

Date: July 2, 2021

Respectfully submitted,

/s/ Max Ciccarelli

Bruce S. Sostek (No. 1885570)
Bruce.sostek@tklaw.com
Massimo Ciccarelli (No. 00787242)
Max.ciccarelli@tklaw.com
Thompson & Knight LLP
One Arts Plaza
1722 Routh Street
Suite 1500
Dallas, TX 75201-2533
Tel: 214.969.1237
Fax: 214.880.3252

Counsel for Defendants and Counterclaim Plaintiffs 3Shape Trios A/S and 3Shape A/S

Kimberly Coghill *(pro hac vice)*
Bryan J. Cannon *(pro hac vice)*
TROUTMAN PEPPER HAMILTON SANDERS LLP
401 9th Street, N. W.
Suite 1000
Washington, D.C. 20004
Tel: 202.220.1200
Fax: 202.220.1465

William D. Belanger *(pro hac vice)*
Gregory Len *(pro hac vice)*
Frank D. Liu*(pro hac vice)*
Brittanee Petrik *(pro hac vice)*
Ana Spone *(pro hac vice)*
Gwendolyn Tawresey *(pro hac vice)*
TROUTMAN PEPPER HAMILTON SANDERS LLP
125 High Street
19th Floor, High Street Tower
Boston, MA 02110
Tel: 617.204.5100
Fax: 617.204.5150
Email:
3Shape979Troutman@Troutman.com